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09/848,577	05/03/2001	Young-Hoon Park	YPL-0017	6816

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EXAMINER

MOORE, KARLA'A

ART UNIT	PAPER NUMBER
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1763

DATE MAILED: 10/06/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/848,577

Applicant(s)

PARK, YOUNG-HOON

Examiner

Karla Moore

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 July 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

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DETAILED ACTION

Claim Objections

1. Claims 1-20 are objected to because of the following informalities: Line 15 of Claim 1 recites "a passage radically formed...". Based on the specification, Examiner assumes that the word "radically" should actually be "radially" and has examined the application using this assumption. Appropriate correction and/or clarification is required.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1, 3-5, 14, 17-18 and 20 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,338,363 to Kawata et al.

4. Kawata et al. disclose a thin film deposition reactor in Figure 10, comprising: a reactor block (201) on which a wafer is placed; a showerhead plate (17) for uniformly maintaining a predetermined pressure by covering the reactor block; a wafer block (5) installed in the reactor block, on which the wafer is to be seated; an exhausting portion (20) connected to the reactor block for exhausting a gas from the reactor block; a first connection line (19a, 19b) in communication with the shower head plate capable of supplying a first reaction gas and/or inert gas; a second connection line (28) in communication with the showerhead plate capable of supplying a second reaction and/or inert gas; and a diffusion plate (11)

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mounted on a lower surface of the showerhead plate, the diffusion plate having a plurality of spray holes (12) which are in communication with the first connection line and face the upper face of the wafer and capable of spraying the first reaction gas and/or inert gas onto the wafer, and a plurality of nozzles (Figure 5, 25-upper surface and narrow portion leading to reaction space 4) which is in communication a passage (horizontal passage connected to second connection line/28) radially formed from the second connection line and extend toward the inner surface side of the reactor block to spray the second reaction gas and/or inert gas toward the edges of the wafer.

5. With respect to claims 3, 18 and 20, although not illustrated, Kawata et al. teach the diffusion plate having a lower surface of convex form (column 6, rows 32-38).

6. With respect to claim 4, the diffusion plate further comprises a first diffusion plate (11a) in communication with the plurality of spray holes and the first connection line and a second diffusion plate (11b) in communication with the plurality of nozzles and the second connection line (see Figure 5).

7. With respect to claim 5, the reactor further comprises a first mixing portion (inside of 17) at a center of the inside of the diffusion plate capable of mixing two gases, such as a reaction gas and an inert gas and diffusing the mixture to the spray holes.

8. With respect to claim 7, the area of the diffusion plate on which the spray holes are formed is larger than the wafer (Figure 10).

9. With respect to claims 14 and 17, the reactor further comprises a pumping baffle (13) which is installed on the outer circumference of the wafer block, the pumping baffle comprising a sidewall (above baffle and towards the center of the reactor) placed around the lateral side of the wafer block, a bottom wall (below baffle and towards exterior of baffle) extended outward from a lower end of the sidewall, and holes (for heater 8 and leading to exhaust 20) formed in the bottom wall. Both the heater holes and exhaust holes are formed on each side of the reactor and are therefor symmetrical.

10. Examiner recognizes that Applicant has amended to recite that the first and second connection connection lines supply both a reaction gas and an inert gas. However, the type of gas supplied in the apparatus is not of primary importance in an apparatus claims. The courts have ruled that expressions relating the apparatus to contents thereof during an intended operation are of no significance in

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determining patentability of the apparatus claim. Ex parte Thibault, 164 USPQ 666, 667 (Bd. App. 1969). Additionally, the courts have ruled that a claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. Ex parte Masham, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987).

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. Claims 2 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawata et al. as applied to claims 1, 3-5, 7, 14, 17-18 and 20 above, and further in view of U.S. Patent No. 5,439,524 to Cain et al.

13. Kawata et al. disclose the invention substantially as claimed and as described above.

14. However, Kawata et al. fail to teach a diffusion plate with at lower surface of a concave form.

15. Cain et al. teach a diffusion plate with a concave form (Figure 2) for the purpose of significantly improved uniformity of processing (column 3, rows 48-57 and column 4, rows 40-46).

16. It would have been obvious to one of ordinary skill in the art at the time the Applicant's invention was made to have provided a diffusion plate with a concave form in Kawata et al. in order to provide improved uniformity of processing as taught by Cain et al.

17. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kawata et al. as applied to claims 1, 3-5, 7, 14, 17-18 and 20 above, and further in view of Japanese Patent No. 02-015171 A to Okazaki et al.

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18. Kawata et al. disclose the invention substantially as claimed and as described above, and further including an auxiliary diffusion plate (26) in which holes (27 and/or 46) are formed.

19. However, Kawata et al. fail to teach the deposition reactor further comprising a second mixing portion between the second line and the shower head capable of mixing a reaction gas and an inert gas supplied from the second connection line and diffusing the mixture through the passage.

20. Okamura teaches sufficiently agitating and mixing gases while they are flowing between a gas inlet and a substrate for the purpose of forming a thin film with excellent evenness (abstract).

21. It would have been obvious to one of ordinary skill in the art at the time the Applicant's invention was made to have provided a second mixing portion between the second line and the showerhead capable of mixing a reaction gas and an inert gas in Kawata et al. in order to form a thin film with excellent evenness as taught by Okamura.

22. Claims 8-9 and 12 rejected under 35 U.S.C. 103(a) as being unpatentable over Kawata et al. as applied to claims 1, 3-5, 7, 14, 17-18 and 20 above, and further in view of U.S. Patent No. 5,976,261 to Moleshi et al.

23. Kawata et al. disclose the invention substantially as claimed and as described above.

24. However, Kawata et al. fail to specifically teach the diameter of the spray holes being 1 to 2.5 mm or the number of spray holes being 100-1000.

25. Moleshi et al. teach that in showerhead design the diameter and the number of spray holes can be varied to optimize flow control and uniformity (column 5, rows 34-36).

26. It would have been obvious to one of ordinary skill in the art at the time the Applicant's invention was made to have varied the diameter and number of spray holes in Kawata et al. in order to optimize flow control and uniformity as taught by Moleshi et al.

27. Claims 10 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawata et al. as applied to claims 1, 3-5, 7, 14, 17-18 and 20 above, and further in view of U.S. Patent No. 5,425,812 to Tsutahara et al.

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28. Kawata disclose the invention substantially as claimed and as described above.

29. However, Kawata et al. fail to teach a spray hole comprising a lower and upper end and the upper end has a diameter larger than that of the lower end and a step portion is formed between the upper and lower end.

30. Tsutahara et al. teach a spray hole configuration (Figure 15; column 9, rows 21-26) comprising a larger diameter upper portion and a smaller diameter lower portion formed in between for the purpose of maintaining a blowout flow from each hole at a constant rate and to supply thoroughly diffused gas to the surface of the water and to prevent drifting of the flow.

31. It would have been obvious to one of ordinary skill in the art at the time the Applicant's invention was made to have provided a spray hole configuration in Kawata et al. comprising a larger diameter upper portion and a smaller diameter lower portion with a step portion formed in between in order to maintain blowout flow from each hole at a constant rate and to supply thoroughly diffused gas to the surface of the wafer and prevent drifting of the flow as taught by Tsutahara et al.

32. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kawata et al. and Tsutahara et al. as applied to claims 10 and 15 above, and further in view of Japanese Patent No. 09-316644 to Arai et al.

33. The prior art applied above discloses the invention substantially as claimed.

34. However, the prior art fails to teach a diffusion plate with a thickness of at least 5 mm.

35. Arai et al. teach the use of a diffusion plate with a thickness of at least 5 mm for the purpose of obtaining a thin film of good quality in a short time (solution of abstract).

36. It would have been obvious to one of ordinary skill in the art at the time the Applicant's invention was made to have provided a diffusion plate with a thickness of at least 5 mm in the prior art applied above in order to obtain a thin film of good quality in a short time as taught by Arai et al.

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37. Claim 13 rejected under 35 U.S.C. 103(a) as being unpatentable over Kawata et al. as applied to claims 1, 3-5, 7, 14, 17-18 and 20 above, and further in view of U.S. Patent No. 5,076,207 to Washitani et al.

38. Kawata et al. disclose the invention substantially as claimed.

39. However, Kawata et al. fail to teach a distance between the diffusion plate and wafer block of 20-50 mm.

40. Washitani et al. teach a distance between the diffusion plate and wafer block of 20-50 mm for the purpose of obtaining a satisfactory film forming speed and a high degree of surface uniformity (Washitani et al. specifically teach a distance of 8-25 mm; column 5, rows 13-15).

41. It would have been obvious to one of ordinary skill in the art at the time the Applicant's invention was made to have allowed a distance of 20-50 mm between the diffusion plate and wafer block in order obtain a satisfactory film forming speed and a high degree of surface uniformity as taught by Washitani et al.

42. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kawata et al. as applied to claims 1, 3-5, 7, 14, 17-18 and 20 above and further in view of Japanese Patent No. 09-316644 to Arai et al.

43. The prior art applied above disclose the invention substantially as claimed.

44. However, Kawata et al. fail to teach a diffusion plate with a thickness of at least 5 mm.

45. Arai et al. teach the use of a diffusion plate with a thickness of at least 5 mm for the purpose of obtaining a thin film of good quality in a short time (solution of abstract).

46. It would have been obvious to one of ordinary skill in the art at the time the Applicant's invention was made to have provided a diffusion plate with a thickness of at least 5 mm in Kawata et al. in order to obtain a thin film of good quality in a short time as taught by Arai et al.

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Response to Arguments

47. Applicant's arguments filed 07/24/03, with respect to claims 1-5 and 7-20 have been fully considered but they are not persuasive.

48. Applicant has amended the apparatus claims to recite the types of gases which are supplied through the first and second gas connection lines. As noted above, these recitations are not of primary importance for the present invention, which is an apparatus. In the preceding rejection, Examiner has pointed out that either of the connection lines (the first connection line in Kawata is 19A or 19B, the second connection line in Kawata is 28) would be capable of supplying a reaction gas and/or an inert gas.

49. Examiner has recited new art in the rejection of claim 6. While the second connection line in Kawata et al. would be capable of supplying a reaction gas and/or an inert gas, Kawata et al. does not teach or fairly suggest mixing two gases supplied through the second connection line. Okamura remedies this deficiency.

Conclusion

50. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Karla Moore whose telephone number is 703.305.3142. The examiner can normally be reached on Monday-Friday, 8:30am-5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory Mills can be reached on 703.308.1633. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703.308.0661.

km


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